



Installing Field-Replaceable Units in Cisco 3745 Routers

Product Numbers: CISCO3745-CHAS+MP=, CISCO3745-MB=, CISCO3745-2FE-I/O=, PWR-3745-AC=, PWR-3745-DC=, PWR-3745-DC-U=, CISCO3745 FanASSY=

This document describes how to install field-replaceable units (FRUs) in a Cisco 3745 router.

This document is intended for the power supply installer, who should be familiar with electronic circuitry and wiring practices and have experience as an electronic or electromechanical technician. Use this document in conjunction with the *Cisco 3700 Series Hardware Installation Guide* and the *Regulatory Compliance and Safety Information* document for your router.

If you have questions or need help, refer to the [“Obtaining Technical Assistance”](#) section on page 29.

This document contains the following sections:

- [Safety Recommendations and Warnings, page 2](#)
- [Preventing Electrostatic Discharge Damage, page 4](#)
- [Notes, Cautions, and Warnings, page 5](#)
- [FCC Class A Compliance, page 9](#)
- [Required Tools and Equipment, page 9](#)
- [Replacing Cisco 3745 Chassis Power Supplies, page 10](#)
- [Replacing the Cisco 3745 Router Mainboard Tray, page 21](#)
- [Replacing the Cisco 3745 Router I/O Board, page 22](#)
- [Replacing the Cisco 3745 Fan Assembly and Bezel, page 24](#)
- [Replacing the Cisco 3745 Spare Chassis and Midplane, page 25](#)
- [Replacing Connections to the Router, page 26](#)
- [Troubleshooting, page 27](#)
- [Obtaining Documentation, page 28](#)
- [Obtaining Technical Assistance, page 29](#)
- [Obtaining Additional Publications and Information, page 31](#)

Before performing procedures described in this document, review the next section, “[Safety Recommendations and Warnings](#).”

Safety Recommendations and Warnings

General Safety Guidelines

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Place the removed chassis fan tray in a safe place.
- Keep tools away from walk areas where you or others could fall over them.
- Do not wear loose clothing that may get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses when working under conditions that may be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

The following warnings apply to all Cisco 3745 routers:



Warning

Only trained and qualified personnel should be allowed to install or replace this equipment. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



Warning

This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



Warning

Ultimate disposal of this product should be handled according to all national laws and regulations. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Safety with Electricity

The following warnings apply to all Cisco 3745 routers:



Warning

Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Warning**

Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Warning**

The ISDN connection is regarded as a source of voltage that should be inaccessible to user contact. Do not attempt to tamper with or open any public telephone operator (PTO)-provided equipment or connection hardware. Any hardwired connection (other than by a nonremovable, connect-one-time-only plug) must be made only by PTO staff or suitably trained engineers. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Warning**

The Ethernet 10BaseT, Token Ring, serial, console, and auxiliary ports contain safety extra-low voltage (SELV) circuits. BRI circuits are treated like telephone-network voltage (TNV) circuits. Avoid connecting SELV circuits to TNV circuits. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

The following warning applies to routers with DC power supplies:

**Warning**

Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

The following warning applies to routers with AC power supplies:

**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:
15A, 120VAC (10A, 240VAC)
To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Warning**

Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Follow these guidelines when working on equipment powered by electricity:

- Locate the room's emergency power-off switch. Then, if an electrical accident occurs, you can quickly shut the power off.
- Before working on the system, turn off the power and unplug the power cord.

- Disconnect all power before doing the following:
 - Working on or near power supplies
 - Installing or removing a router chassis or network processor module
 - Performing most hardware upgrades
- Do not work alone if potentially hazardous conditions exist.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Never assume that power is disconnected from a circuit. Always check.
- If an electrical accident occurs, proceed as follows:
 - Use caution, and do not become a victim yourself.
 - Turn off power to the system.
 - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim and then call for help.
 - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures. Always follow ESD prevention procedures when removing and replacing cards. Ensure that the router chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground. To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.



Caution

To avoid damaging electrostatic discharge (ESD)-sensitive components, ensure that you have discharged all static electricity from your body before opening the chassis.



Caution

For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).



Caution

Before opening the chassis, be sure that you have discharged all static electricity from your body and the power is off.

Notes, Cautions, and Warnings

Notes, cautions, and warnings use the following conventions and symbols.



Note

Means *reader take note*. Notes contain helpful suggestions or references to additional information and material.



Caution

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.



Warning

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the translated safety warnings that accompanied this device.

Note: SAVE THESE INSTRUCTIONS

Note: This documentation is to be used in conjunction with the specific product installation guide that shipped with the product. Please refer to the Installation Guide, Configuration Guide, or other enclosed additional documentation for further details.

Waarschuwing

BELANGRIJKE VEILIGHEIDSINSTRUCTIES

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Voor een vertaling van de waarschuwingen die in deze publicatie verschijnen, dient u de vertaalde veiligheidswaarschuwingen te raadplegen die bij dit apparaat worden geleverd.

Opmerking BEWAAR DEZE INSTRUCTIES.

Opmerking Deze documentatie dient gebruikt te worden in combinatie met de installatiehandleiding voor het specifieke product die bij het product wordt geleverd. Raadpleeg de installatiehandleiding, configuratiehandleiding of andere verdere ingesloten documentatie voor meer informatie.

Varoitus TÄRKEITÄ TURVALLISUUTEEN LIITTYVIÄ OHJEITA

Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä asiakirjassa esitettyjen varoitusten käännökset löydät laitteen mukana toimitetuista ohjeista.

Huomautus SÄILYTÄ NÄMÄ OHJEET

Huomautus Tämä asiakirja on tarkoitettu käytettäväksi yhdessä tuotteen mukana tulleen asennusoppaan kanssa. Katso lisätietoja asennusoppaasta, kokoonpano-oppaasta ja muista mukana toimitetuista asiakirjoista.

Attention IMPORTANTES INFORMATIONS DE SÉCURITÉ

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez les consignes de sécurité traduites qui accompagnent cet appareil.

Remarque CONSERVEZ CES INFORMATIONS

Remarque Cette documentation doit être utilisée avec le guide spécifique d'installation du produit qui accompagne ce dernier. Veuillez vous reporter au Guide d'installation, au Guide de configuration, ou à toute autre documentation jointe pour de plus amples renseignements.

Warnung WICHTIGE SICHERHEITSANWEISUNGEN

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körpervverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewusst. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise sind im Lieferumfang des Geräts enthalten.

Hinweis BEWAHREN SIE DIESE SICHERHEITSANWEISUNGEN AUF

Hinweis Dieses Handbuch ist zum Gebrauch in Verbindung mit dem Installationshandbuch für Ihr Gerät bestimmt, das dem Gerät beiliegt. Entnehmen Sie bitte alle weiteren Informationen dem Handbuch (Installations- oder Konfigurationshandbuch o. Ä.) für Ihr spezifisches Gerät.

Figyelem! FONTOS BIZTONSÁGI ELŐÍRÁSOK

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejtő helyzetben van. Mielőtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található.

Megjegyzés ŐRIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Megjegyzés Ezt a dokumentációt a készülékhez mellékelt üzembe helyezési útmutatóval együtt kell használni. További tudnivalók a mellékelt Üzembe helyezési útmutatóban (Installation Guide), Konfigurációs útmutatóban (Configuration Guide) vagy más dokumentumban találhatók.

Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Per le traduzioni delle avvertenze riportate in questo documento, vedere le avvertenze di sicurezza che accompagnano questo dispositivo.

Nota CONSERVARE QUESTE ISTRUZIONI

Nota La presente documentazione va usata congiuntamente alla guida di installazione specifica spedita con il prodotto. Per maggiori informazioni, consultare la Guida all'installazione, la Guida alla configurazione o altra documentazione acclusa.

Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER

Dette varselssymbolet betyr fare. Du befinner deg i en situasjon som kan forårsake personskade. Før du utfører arbeid med utstyret, bør du være oppmerksom på farene som er forbundet med elektriske kretssystemer, og du bør være kjent med vanlig praksis for å unngå ulykker. For å se oversettelser av advarslene i denne publikasjonen, se de oversatte sikkerhetsvarslene som følger med denne enheten.

Merk TA VARE PÅ DISSE INSTRUKSJONENE

Merk Denne dokumentasjonen skal brukes i forbindelse med den spesifikke installasjonsveiledningen som fulgte med produktet. Vennligst se installasjonsveiledningen, konfigureringsveiledningen eller annen vedlagt tilleggsdokumentasjon for detaljer.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. O utilizador encontra-se numa situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha em atenção os perigos envolvidos no manuseamento de circuitos eléctricos e familiarize-se com as práticas habituais de prevenção de acidentes. Para ver traduções dos avisos incluídos nesta publicação, consulte os avisos de segurança traduzidos que acompanham este dispositivo.

Nota GUARDE ESTAS INSTRUÇÕES

Nota Esta documentação destina-se a ser utilizada em conjunto com o manual de instalação incluído com o produto específico. Consulte o manual de instalação, o manual de configuração ou outra documentação adicional inclusa, para obter mais informações.

¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Vea las traducciones de las advertencias que acompañan a este dispositivo.

Nota GUARDE ESTAS INSTRUCCIONES

Nota Esta documentación está pensada para ser utilizada con la guía de instalación del producto que lo acompaña. Si necesita más detalles, consulte la Guía de instalación, la Guía de configuración o cualquier documentación adicional adjunta.

Varning! VIKTIGA SÄKERHETSANVISNINGAR

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Se översättningarna av de varningsmeddelanden som finns i denna publikation, och se de översatta säkerhetsvarningarna som medföljer denna anordning.

OBS! SPARA DESSA ANVISNINGAR

OBS! Denna dokumentation ska användas i samband med den specifika produktinstallationshandbok som medföljde produkten. Se installationshandboken, konfigurationshandboken eller annan bifogad ytterligare dokumentation för närmare detaljer.

Предупреждение ВАЖНЫЕ СВЕДЕНИЯ ПО БЕЗОПАСНОСТИ

Этот символ предупреждает о наличии опасности. При неправильных действиях возможно получение травм. Перед началом работы с любым оборудованием необходимо ознакомиться с ситуациями, в которых возможно поражение электротоком, и со стандартными действиями для предотвращения несчастных случаев. Переведенный текст предупреждений содержится в соответствующем документе, поставляемом вместе с устройством.

Примечание СОХРАНЯЙТЕ ЭТУ ИНСТРУКЦИЮ

Примечание Эта инструкция должна использоваться вместе с руководством по установке конкретного изделия, входящим в комплект поставки. Дополнительные сведения см. в руководстве по установке, руководстве по настройке и другой документации, поставляемой с изделием.

警告 有关安全的重要说明

这个警告符号指有危险。您所处的环境可能使身体受伤。操作设备前必须意识到电流的危险性，务必熟悉操作标准，以防发生事故。如果需要了解本说明中出现的警告符号的译文，请参阅本装置所附之安全警告译文。

注意 保存这些说明

注意 本文件应与本产品附带的具体安装说明一并阅读。如欲了解详情，请参阅《安装说明》、《配置说明》或所附的其他文件。

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止対策に留意してください。このマニュアルに記載されている警告の各国語版は、装置に付属の「Translated Safety Warnings」を参照してください。

注 これらの注意事項を保管しておいてください。

注 この資料は、製品に付属のインストレーション ガイドと併用してください。詳細は、インストレーション ガイド、コンフィギュレーション ガイド、または添付されているその他のマニュアルを参照してください。

FCC Class A Compliance

The equipment described in this document generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class A digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain that the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

Required Tools and Equipment

Installation might require some tools and equipment that are not provided as standard equipment with the router. Following are the tools and parts required for a typical router installation:

- Number-2 Phillips screwdriver
- Small flat-blade screwdriver
- ESD-preventive wrist strap
- Antistatic mat

Replacing Cisco 3745 Chassis Power Supplies

The Cisco 3745 router can accommodate two AC or two DC power supplies to supply power to the chassis. Each unit provides up to 230 watts of power, and a single installed power supply meets the router's requirements under most operating conditions. The second power supply provides redundancy, load sharing, and increased system availability. It can be removed without affecting system operation.

**Note**

The Cisco 3745 router also can accommodate two power modules that provide –48VDC power for telephony applications. A separate installation document contains installation procedures for these power modules.

[Figure 1](#) shows the AC power supply for the Cisco 3745 router.

[Figure 2](#) shows the DC power supply for the Cisco 3745 router.

[Figure 3](#) shows Cisco 3745 power connections.

[Figure 4](#) shows the location of the power supply in the Cisco 3745 routers. AC and DC power supplies occupy the same locations in the router.

To remove and install power supplies, perform the following procedures, as required:

- [Removing a Cisco 3745 Chassis Power Supply, page 13](#)
- [Installing a Cisco 3745 Chassis Power Supply, page 17](#)
- [Connecting DC-Input Power, page 18](#)

Observe the following precautions when removing or installing power supplies:

**Warning**

Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Warning**

Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Warning**

Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Figure 1 Cisco 3745 Chassis Power Supply for AC Input

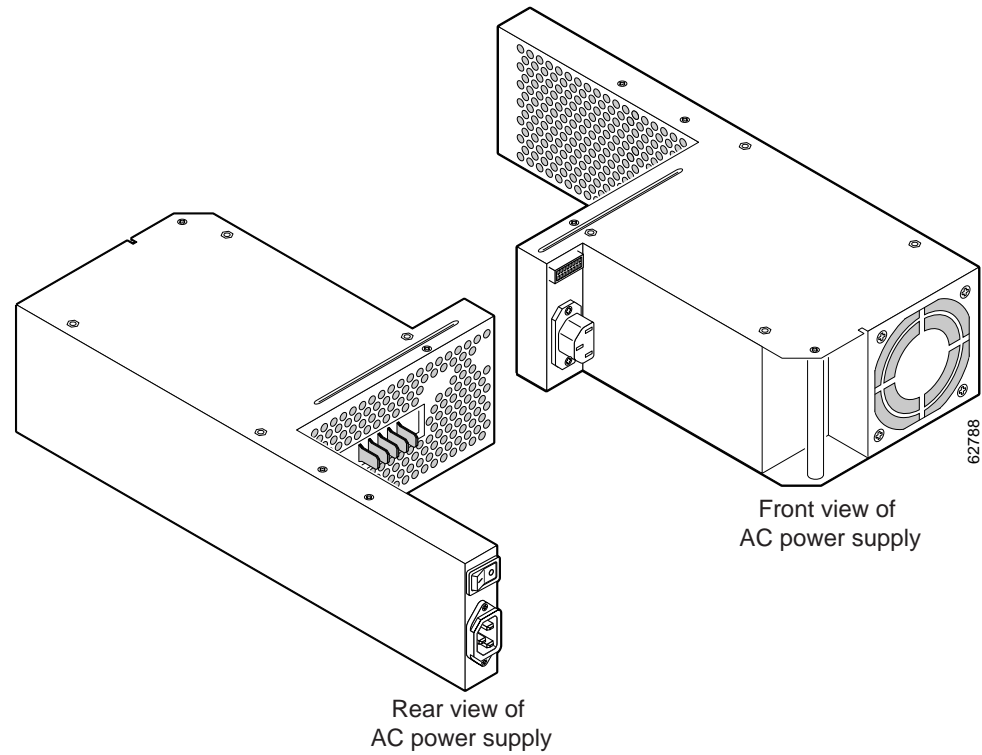


Figure 2 Cisco 3745 Power Supply for DC Input

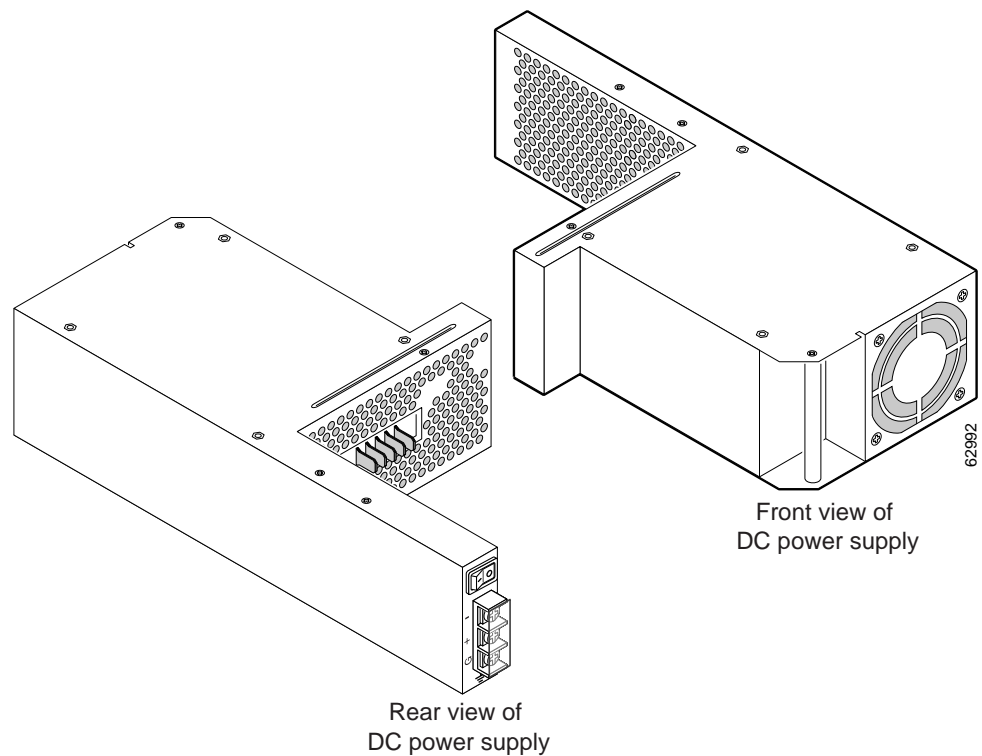


Figure 3 Cisco 3745 Chassis Power Supply Connections

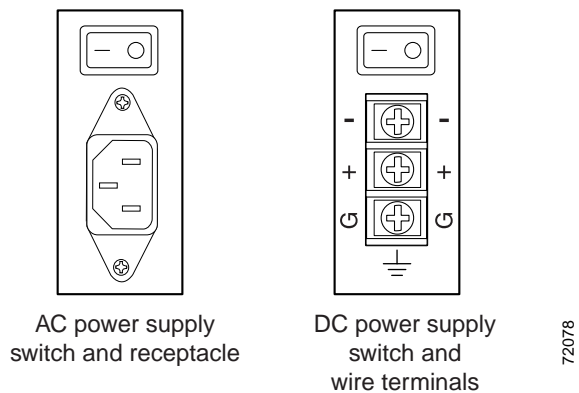
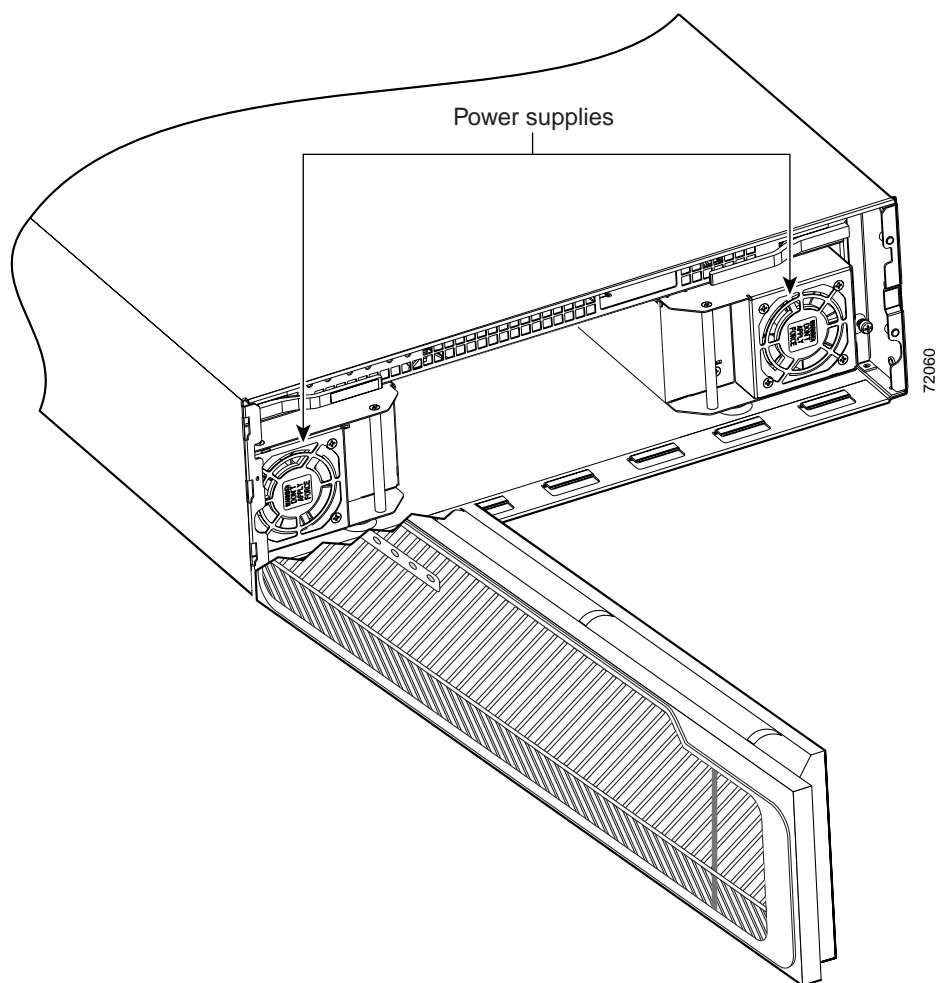


Figure 4 Chassis Power Supply Locations in the Cisco 3745 Router



Removing a Cisco 3745 Chassis Power Supply

To remove a chassis power supply, perform the following steps:

- Step 1** Turn off power to the power supply to be removed.



Warning

Before opening the unit, disconnect the telephone-network cables to avoid contact with telephone-network voltages. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

- Step 2** Remove all network interface cables from the rear panel.



Warning

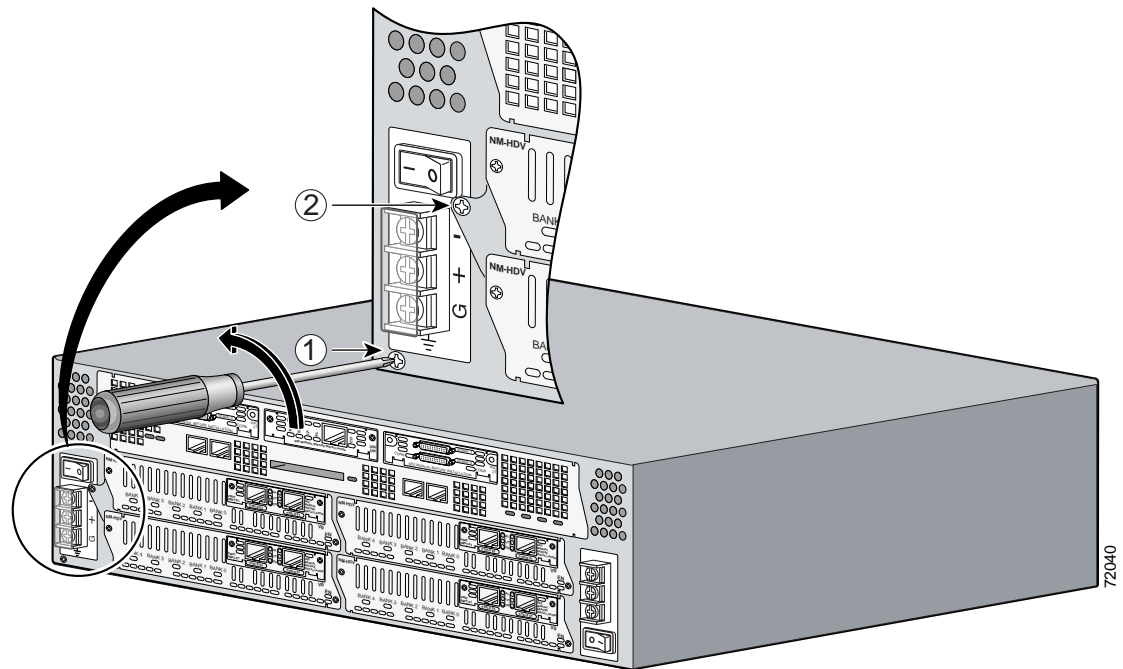
When installing the unit, always make the ground connection first and disconnect it last. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

- Step 3** Disconnect the power cables from the terminal block as follows:

- a. Lift and remove the plastic cover from the terminal block.
- b. Use a screwdriver to remove the three power leads from the terminal block, in this order: (1) negative, (2) positive, (3) ground.

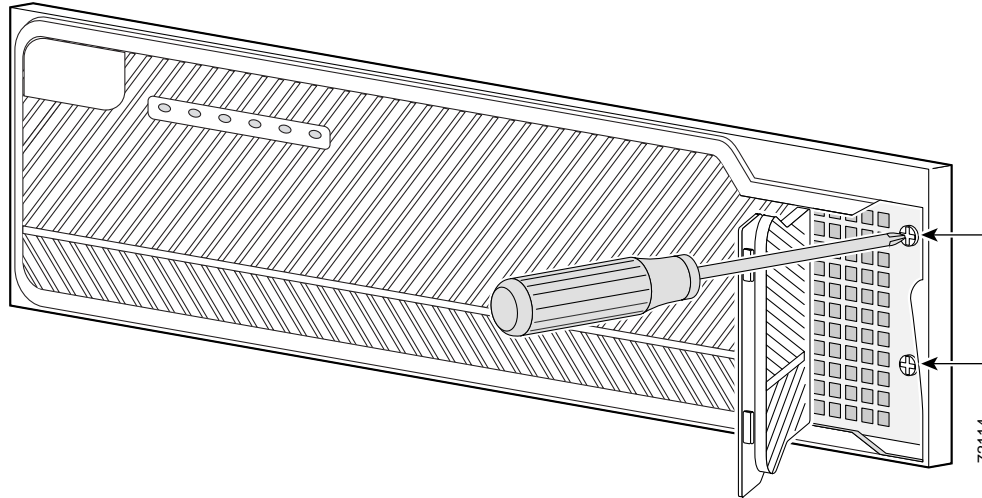
- Step 4** The power supply is held in the chassis by two external mounting screws at the rear of the router. (See [Figure 5](#).) Remove the screws and set them aside.

Figure 5 Removing the Power Supply Mounting Screws



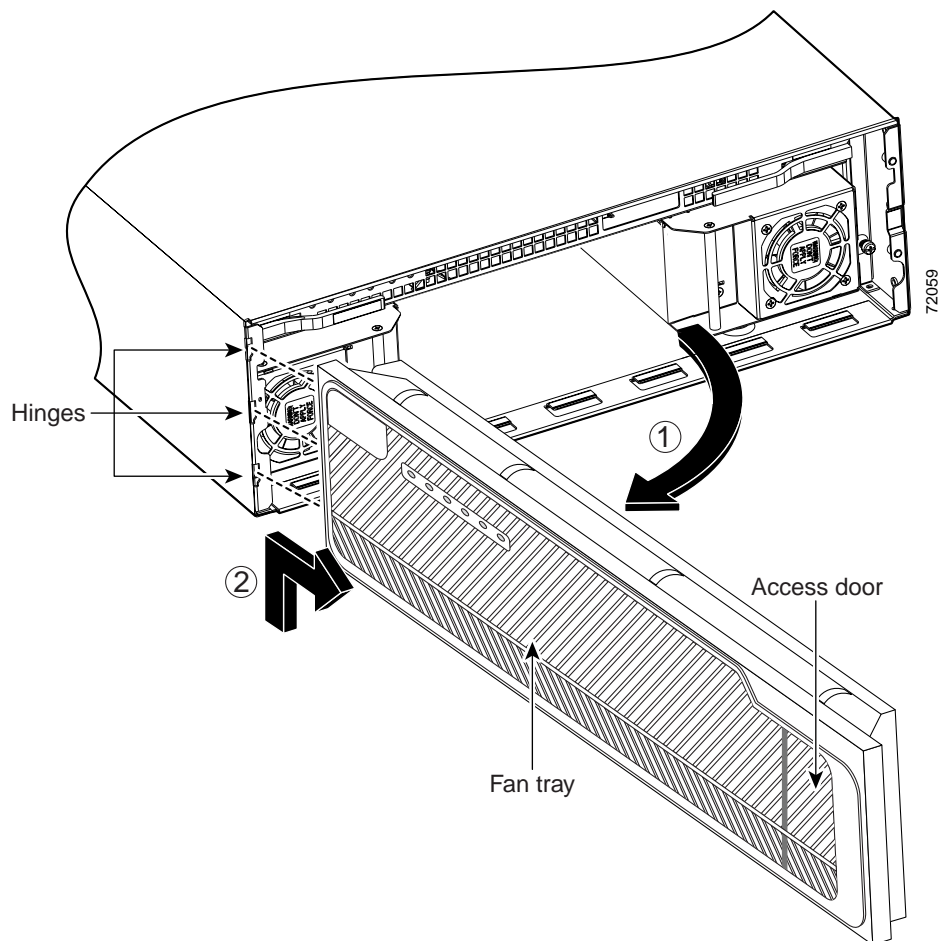
- Step 5** Place the router so that the front panel is facing toward you. Loosen the two fan tray retaining screws located inside the access door. (See [Figure 6](#).)

Figure 6 Loosening the Fan Tray Retaining Screws



Step 6 Open the fan tray to the straight-out position, lift the fan tray off its hinges, and set it aside. (See number 1 and number 2 in [Figure 7](#).)

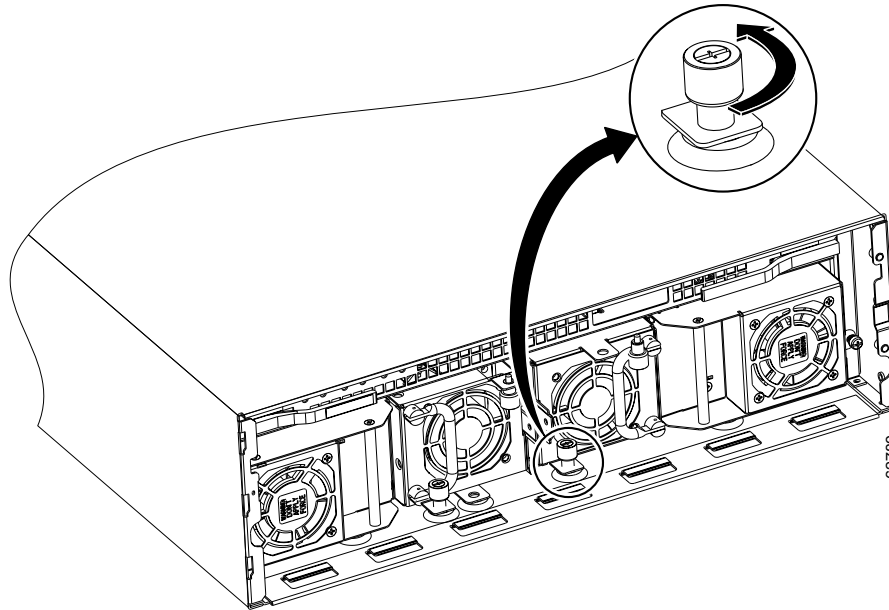
Figure 7 Removing the Cisco 3745 Fan Tray



Step 7 If you are removing an AC power supply and your router has -48V telephony power modules installed, remove the -48V telephony power module next to the power supply you are removing, as described in Steps a and b. If there are no -48V telephony power modules installed, proceed to [Step 8](#).

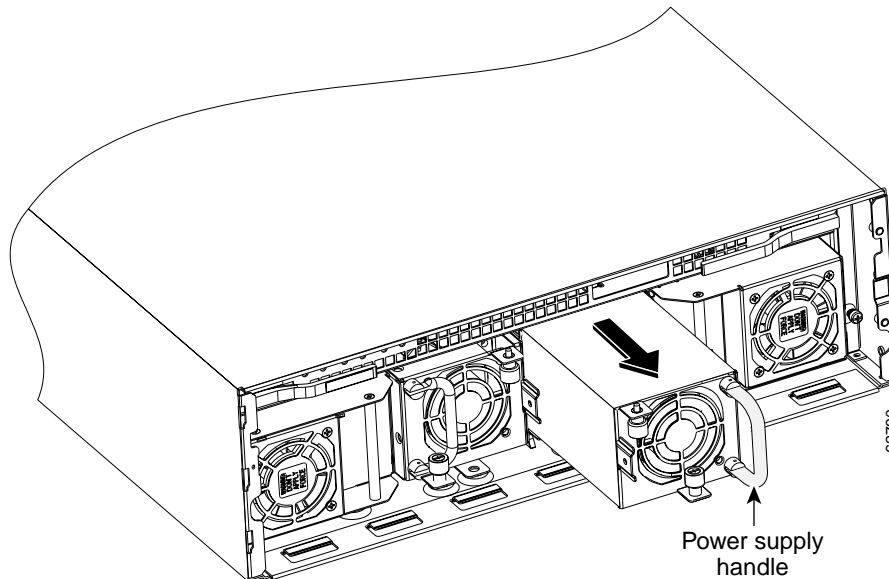
- a. Loosen the captive screw that secures the -48V telephony power module in the chassis. (See [Figure 8](#).)

Figure 8 Retaining Screw for -48V Telephony Power Module



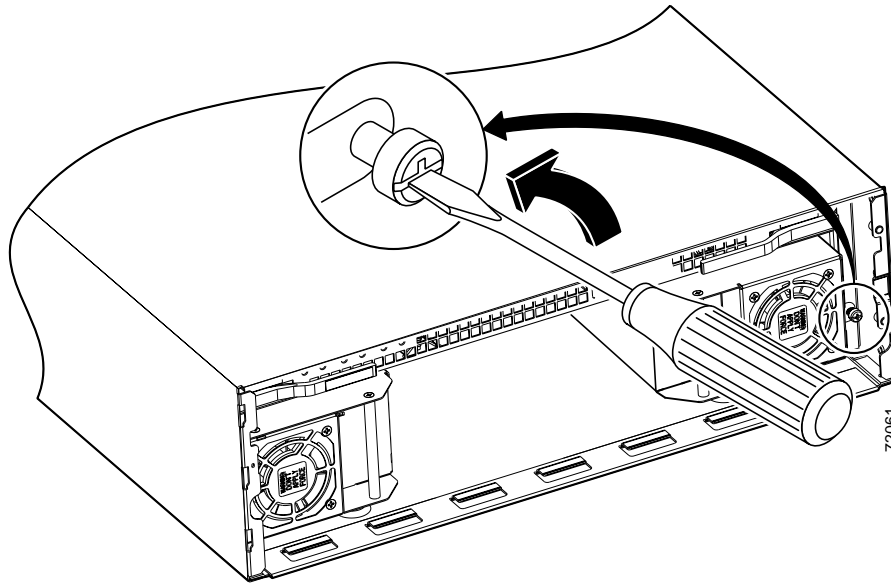
- b. Slide the -48V telephony power module straight out of the router chassis. (See [Figure 9](#).)

Figure 9 Removing the -48V Telephony Power Module



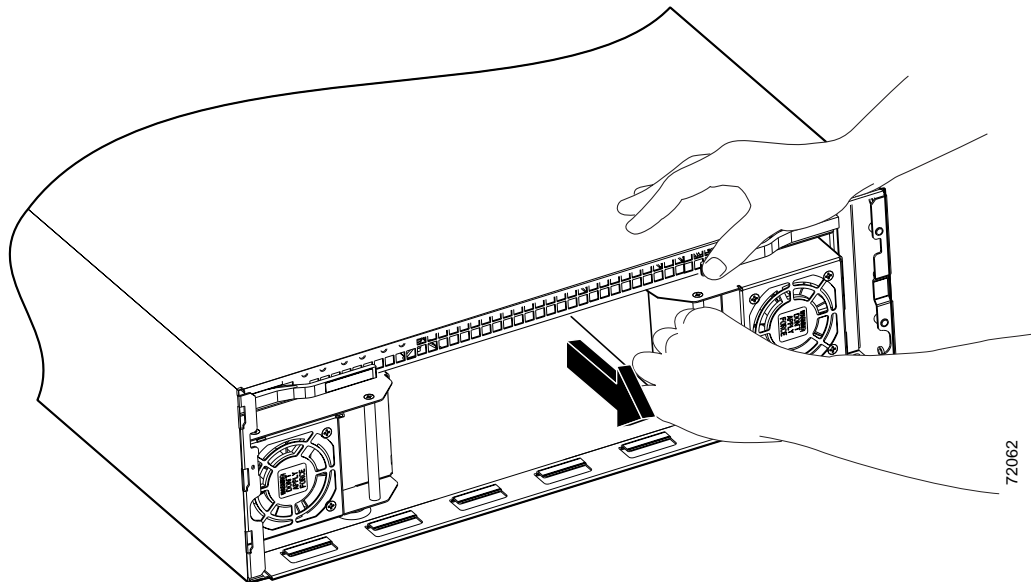
- Step 8** Loosen the power supply retention screw. (See [Figure 10](#).)

Figure 10 Loosening the Power Supply Retention Screw



- Step 9** Pull the power supply straight out of the router chassis. (See [Figure 11](#).)

Figure 11 Removing the Cisco 3745 Chassis Power Supply

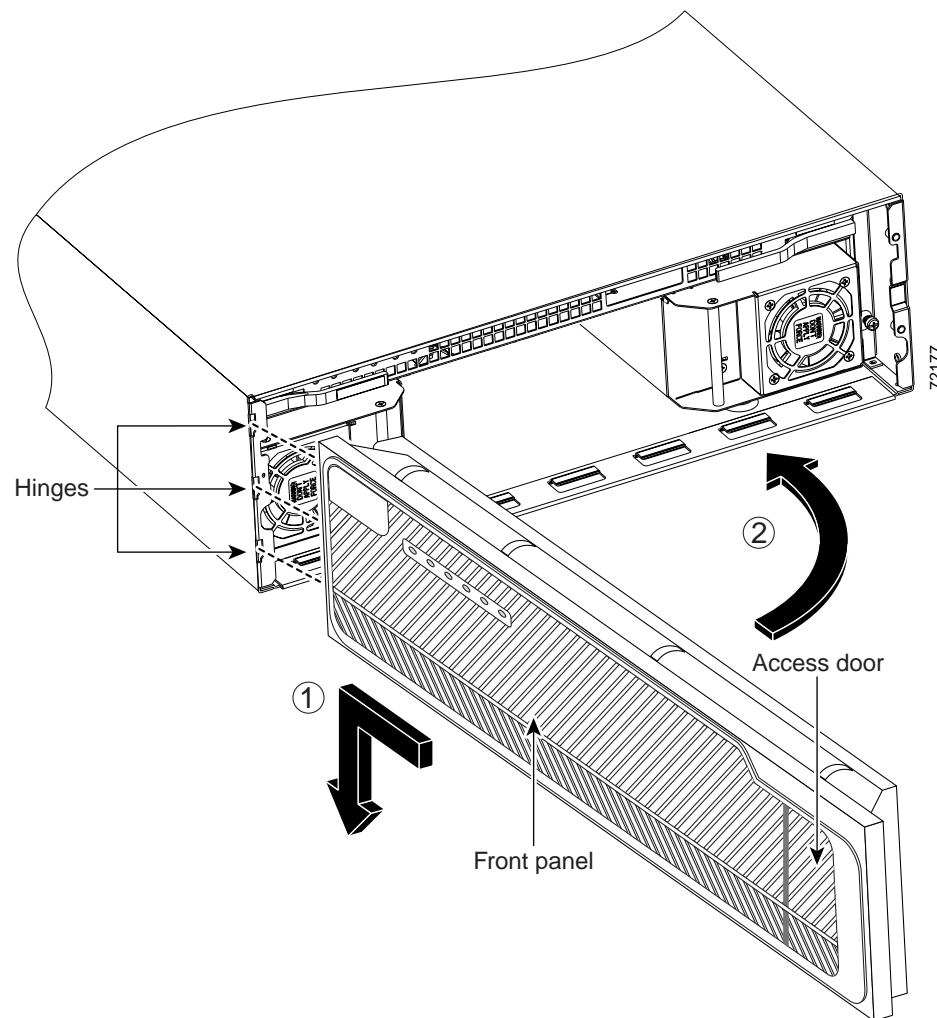


Installing a Cisco 3745 Chassis Power Supply

To install a chassis power supply, perform the following steps:

- Step 1** Carefully slide the power supply straight into the router chassis. (See [Figure 11](#) for reference.)
- Step 2** Tighten the power supply retention screw at the front of the chassis. (See [Figure 10](#) for reference.)
- Step 3** If you are installing an AC power supply and your router uses –48V telephony power modules, install the –48V telephony power module next to the power supply you installed, as described in Steps a and b. If –48V telephony power modules are not required, proceed to [Step 4](#).
 - a. Slide the –48V telephony power module straight into the router chassis. (See [Figure 9](#) for reference.)
 - b. Tighten the captive screw that secures the –48V telephony power module in the chassis. (See [Figure 8](#) for reference.)
- Step 4** Hold the fan tray straight out from the chassis, engage the hinges, and close the fan tray. (See [Figure 12](#), number 1 and number 2.)

Figure 12 Installing the Fan Tray on a Cisco 3745 Router



- Step 5** Tighten the two captive screws located inside the access door. (See [Figure 6](#) for reference.)
- Step 6** Place the router so the rear panel is facing toward you.
- Step 7** Install the two retaining screws at the rear of the chassis. (See [Figure 5](#) for reference.)
- Step 8** If you are installing a PWR-3745-DC-U= universal DC power supply, apply the input voltage label (supplied) over the existing input voltage label on the rear of the chassis.
- Step 9** Connect the network interface cables on the rear panel.


Note

Cisco 3745 routers require a reliable earth ground connection using a ground lug and AWG 16 (13mm²) wire. If your router does not have an earth ground connection, refer to the *Cisco 3745 Quick Start Guide* that was provided with your router, or refer to the *Cisco 3700 Series Hardware Installation Guide* on Cisco.com, for instructions on installing an earth ground.

- Step 10** Connect your router to the appropriate AC or DC power source.
- If your router uses DC power, proceed to the “[Connecting DC-Input Power](#)” section.
- If your router uses AC power, connect the AC power cord. The following warning applies to AC power.


Warning

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:

15A, 120VAC (10A, 240VAC)

To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Connecting DC-Input Power

This section explains how to connect DC power to Cisco 3745 routers.


Warning

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:

20A, 60VDC.

To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.


Note

The installation must comply with the 2002 National Electric Code (NEC) and other applicable codes.


Warning

Use copper conductors only. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Wire and Terminal Requirements

Earlier model power supplies, PWR-3745-DC=, require copper wire, size AWG 14 to 16 (2.0 to 1.2 mm²), for the positive and negative connections and AWG 14 (2.0 mm²) minimum for the ground connection. Use a spade lug, Molex part number 19099-0017 or equivalent, for these connections.

Later model power supplies, PWR-3745-DC-U=, require copper wire, size AWG 12 to 14 (3.0 to 2.0 mm²), for the positive and negative connections and AWG 12 (3.0 mm²) minimum for the ground connection. For connecting AWG 12 wires, use a spade lug, Amp/Tyco part number 52961 or equivalent. For connecting AWG 14 wires, use a spade lug, Molex part number 19099-0017 or equivalent.

Wiring Procedure

To connect the router to a DC power source, perform the following steps. If the DC input wires are already prepared for termination, start with [Step 3](#).

Step 1 Strip the wires to the appropriate length for the spade lugs. The strip length is 1/8 to 3/16 inch (3 to 5 mm) for Molex number 19073-0009 spade lugs.

Step 2 Crimp the spade lugs onto the DC power input wires.



Warning

When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Step 3 Remove the plastic cover from the terminal block. Save it for reinstallation after you finish wiring.

Step 4 Connect the DC power input wires to the terminal block as shown in [Figure 13 on page 20](#).



Warning

This warning applies only to units equipped with DC input power supplies. Wire the DC power supply using the appropriate lugs at the wiring end. The proper wiring sequence is ground to ground, positive to positive (line to L), and negative to negative (neutral to N). Note that the ground wire should always be connected first and disconnected last. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



Caution

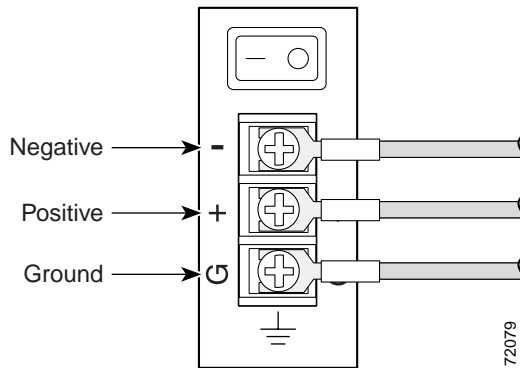
Do not overtorque the terminal block contact screws. The recommended torque is 8.0 ± 0.5 in-lb (0.93 ± 0.05 N-m).



Warning

An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the terminal block plug. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Figure 13 Wire Connections for DC Input



Step 5 Install the plastic cover over the terminals.



Warning

The safety cover is an integral part of the product. Do not operate the unit without the safety cover installed. Operating the unit without the cover in place will invalidate the safety approvals and pose a risk of fire and electrical hazards. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



Warning

After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



Warning

Voltages might be present on the DC-input power supply terminals. Turn off the power source circuit breaker and remove the power supply before accessing the terminals. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Step 6 Secure the wires using cable ties.



Warning

Secure all power cabling when installing this unit to avoid disturbing field-wiring connections. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Replacing the Cisco 3745 Router Mainboard Tray

Removing the Mainboard Tray

To remove the mainboard tray, perform the following steps:

Step 1 Attach an ESD-preventive wrist strap and ensure that it makes good contact with your skin. Connect the equipment end of the wrist strap to the metal backplate of the chassis, avoiding contact with the connectors.

Step 2 Turn off the power and unplug the power cord.



Caution

Be sure that all power supplies are powered off and that all LEDs are off.

Step 3 Place the router on a flat surface so that the front panel faces you, and open the small access door at the right-hand edge of the fan tray.

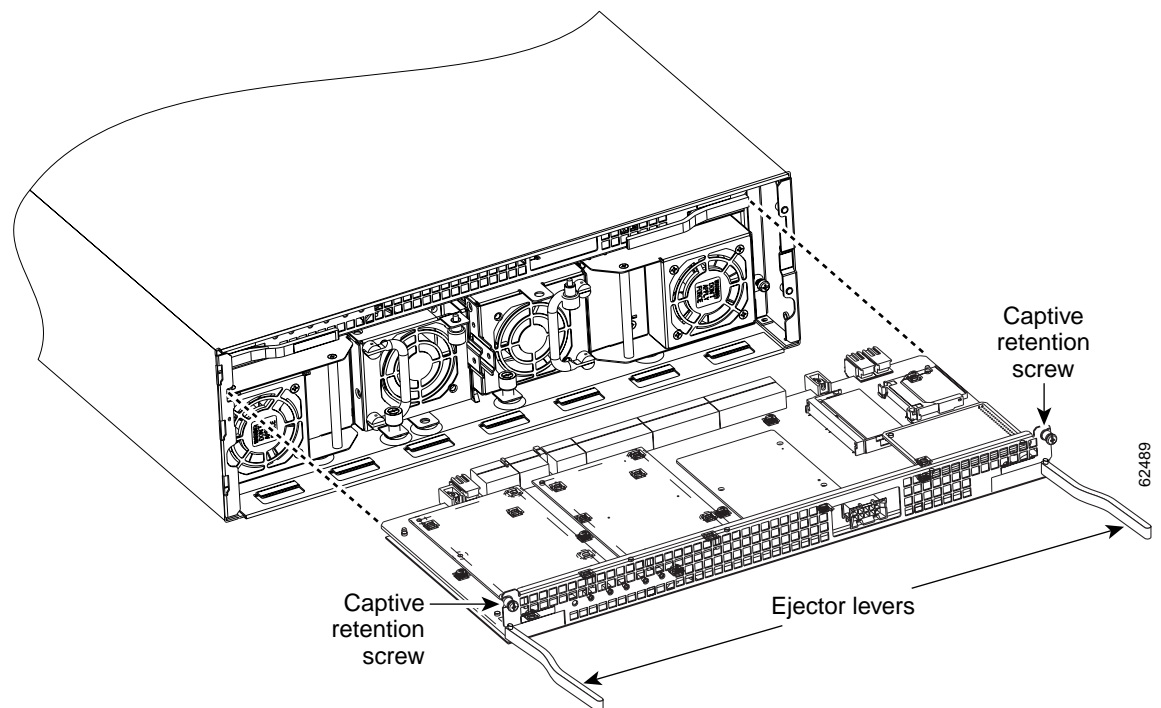
Step 4 Loosen the two captive screws located behind the access door. (See [Figure 6](#).)

Step 5 Open the fan tray to the straight-out position and lift it off its hinges. (See [Figure 7](#), numbers 1 and 2.)

Step 6 Loosen the captive retention screws; there is one at each side of the mainboard. (See [Figure 14](#).)

Step 7 Pull the ejector levers at both sides, and carefully pull the mainboard straight out of the chassis. Place it on an antistatic surface.

Figure 14 Removing the Mainboard from a Cisco 3745 Router





Caution

The mainboard is an ESD-sensitive component. To avoid damage, observe all ESD precautions.

- Step 8** When you are ready to install the mainboard tray, see the [“Installing the Mainboard Tray”](#) section that follows.

Installing the Mainboard Tray

To replace the mainboard, perform the following steps:

- Step 1** Place the chassis so that the empty mainboard slot faces you. Make sure that all cables are securely tucked in and that they are not in danger of being stressed or cut.
- Step 2** Make sure that the ejector levers are fully open. Carefully insert the mainboard tray into the chassis slot until the connector is engaged, then close the ejector levers to fully seat the mainboard connector. (See [Figure 14](#).)
- Step 3** With a number 2 Phillips screwdriver, tighten the two captive retention screws (one at each edge of the mainboard).
- Step 4** Hold the fan tray straight out from the chassis, engage the hinges, and close the fan tray. (See [Figure 12](#), numbers 1 and 2.)
- Step 5** Tighten the two captive screws behind the small access door at the right-hand edge. (See [Figure 6](#).)
- Step 6** Reinstall the chassis on a rack or desktop.
- Step 7** Proceed to the [“Replacing Connections to the Router”](#) section on page 26.

Replacing the Cisco 3745 Router I/O Board

Removing the I/O Board

To remove the I/O board, perform the following steps:

- Step 1** Attach an ESD-preventive wrist strap and ensure that it makes good contact with your skin. Connect the equipment end of the wrist strap to the metal backplate of the chassis, avoiding contact with the connectors.
- Step 2** Turn off the power and unplug the power cord.

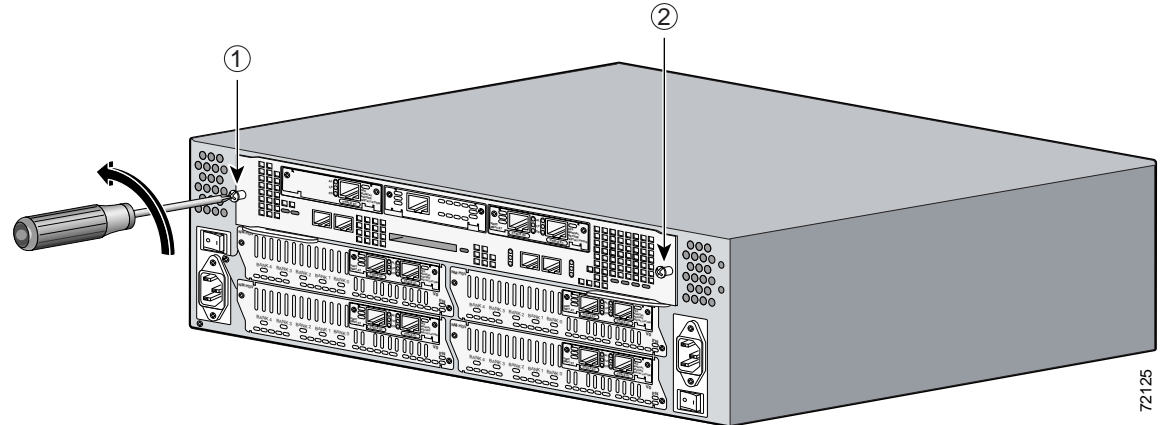


Caution

The Cisco 3745 router can have more than one power supply. Be sure that all power supplies are powered off and that all LEDs are off.

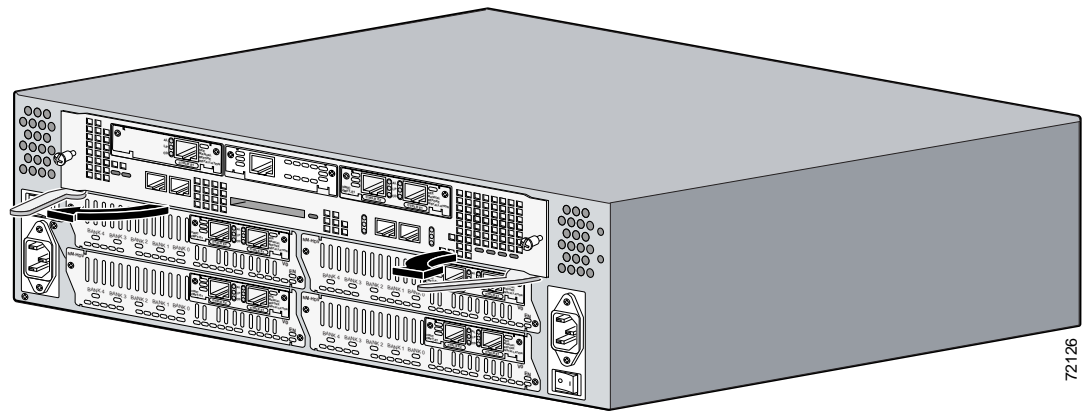
- Step 3** Place the router on a flat surface so that the rear panel faces you.
- Step 4** Loosen the two captive screws located at each end of the I/O board. (See [Figure 15](#).)

Figure 15 Loosening the I/O Board Captive Screws



Step 5 Pull the ejector levers at both sides. (See [Figure 16](#).)

Figure 16 Ejection Levers on the I/O board

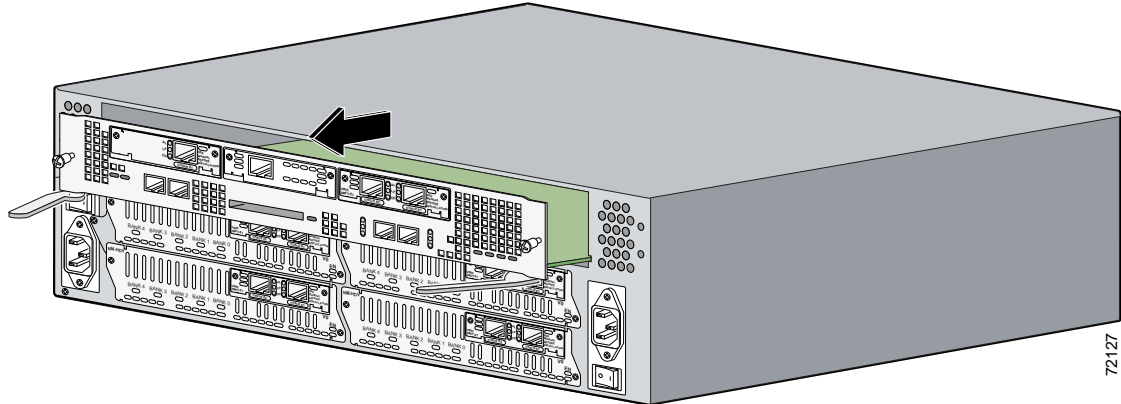


Caution

The I/O board is an ESD-sensitive component. To avoid damage, observe all ESD precautions.

Step 6 Carefully pull the I/O board straight out of the chassis. Place it on an antistatic surface. (See [Figure 17](#).)

Figure 17 Removing the I/O board



Step 7 When you are ready to install the I/O board, see the [“Installing the I/O Board”](#) section that follows.

Installing the I/O Board

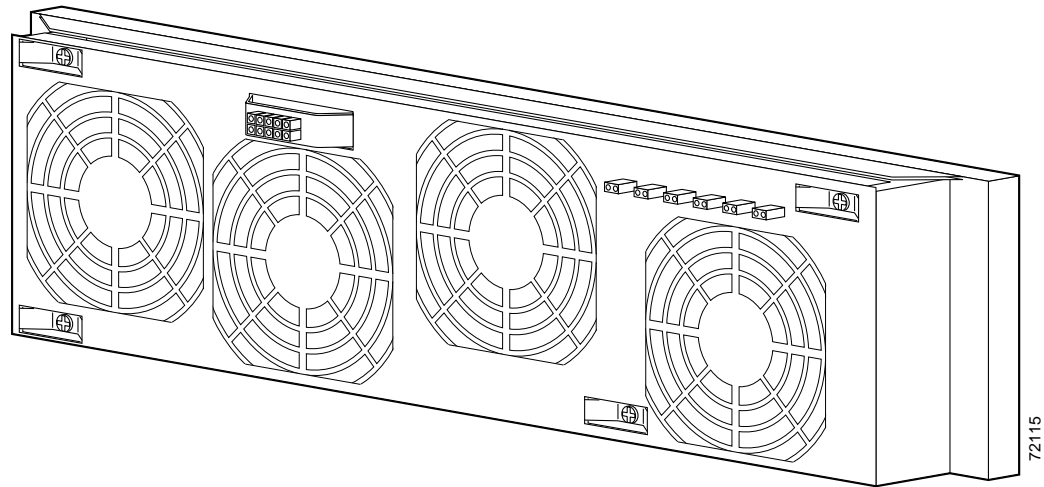
To replace the I/O board, perform the following steps:

- Step 1** Place the chassis so that the empty I/O board slot faces you. Make sure that all cables are securely tucked in and that they are not in danger of being stressed or cut.
- Step 2** Make sure that the ejector levers are fully open. Carefully insert the I/O board tray into the chassis slot until the connector is engaged, then close the ejector levers to fully seat the I/O board connector. (See [Figure 16](#).)
- Step 3** With a number 2 Phillips screwdriver, tighten the two captive retention screws (one at each edge of the I/O board). (See [Figure 15](#).)
- Step 4** Reinstall the chassis on a rack or desktop.
- Step 5** Proceed to the [“Replacing Connections to the Router”](#) section on page 26.

Replacing the Cisco 3745 Fan Assembly and Bezel

The fan assembly and bezel for the Cisco 3745 router is contained in the fan tray. [Figure 18](#) shows the fan assembly and bezel for the Cisco 3745 router.

Figure 18 Fan Assembly and Bezel from a Cisco 3745 Router



Removing the Fan Assembly and Bezel

To replace the Cisco 3745 fan assembly and bezel, perform the following steps:

-
- | | |
|---------------|--|
| Step 1 | Place the router so that the front panel is closest to you. Loosen the two captive screws located inside the access door. (See Figure 6 .) |
| Step 2 | Open the fan tray to the straight-out position and lift the fan tray off its hinges. (See number 1 and number 2 in Figure 7 .) |
-

Installing the Fan Assembly and Bezel

To install the fan assembly and bezel in the chassis, perform the following steps:

-
- | | |
|---------------|--|
| Step 1 | Hold the fan tray straight out from the chassis, engage the hinges, and close the fan tray. (See Figure 12 , number 1 and number 2.) |
| Step 2 | Tighten the two captive screws located inside the access door. (See Figure 6 .) |
-

Replacing the Cisco 3745 Spare Chassis and Midplane

The Cisco 3745 spare chassis and midplane comes from Cisco as a single unit completely assembled. No assembly is required for the Cisco 3745 spare chassis and midplane.

To install Cisco 3745 power supplies, mainboard tray, I/O board, and fan assembly and bezel refer to following sections:

- [Replacing Cisco 3745 Chassis Power Supplies, page 10](#)
- [Replacing the Cisco 3745 Router Mainboard Tray, page 21](#)

- [Replacing the Cisco 3745 Router I/O Board, page 22](#)
- [Replacing the Cisco 3745 Fan Assembly and Bezel, page 24](#)

Replacing Connections to the Router

To make final connections to the router, perform the following steps.



Warning

Read the installation instructions before you connect the system to its power source. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

-
- Step 1** Replace all network connections.
- Step 2** Do one of the following:
- **AC-powered router**—Plug the power cord into a 3-terminal, single-phase power source that provides power within the acceptable range (100 to 240 VAC, 50 to 60 Hz).
 - **DC-powered router**—Remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position.
- Step 3** Turn on the power switch. The power LED on the front panel of the router should turn green. The power LED on the left side of the rear panel, and the LED near the power supply switch should also turn green.
- Step 4** Check the system LED on the left side of the front panel, and the system LED on the left side of the rear panel to verify that they are green, after a few seconds delay when booting.
- Step 5** If you have problems, see the [“Obtaining Technical Assistance”](#) section on page 29.
-

Powering On the Router



Warning

The plug-socket combination must be accessible at all times because it serves as the main disconnecting device. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



Caution

To ensure adequate cooling, never operate the router unless the unit is completely closed.

To power on the router, perform the following steps:

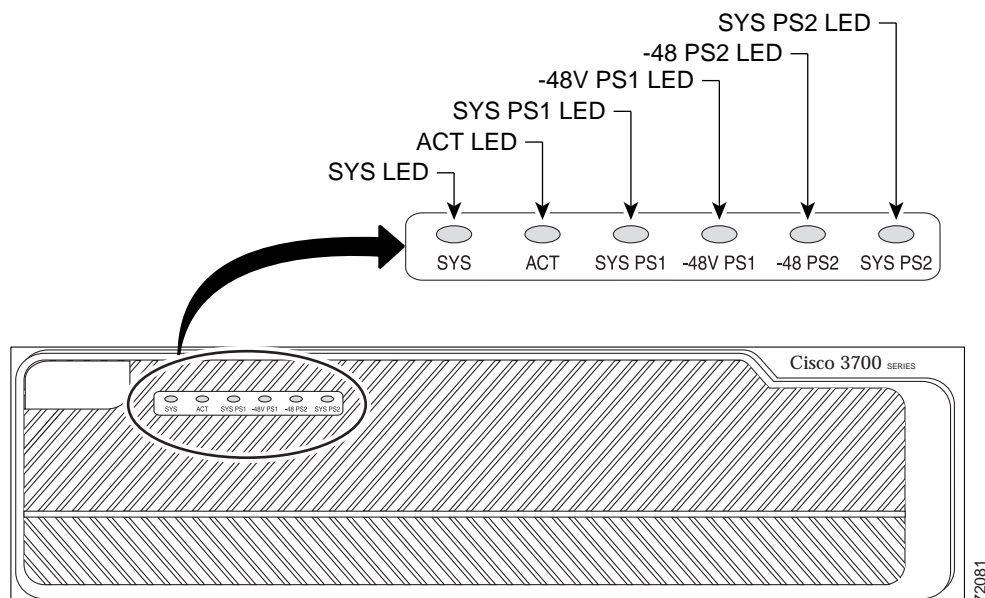
-
- Step 1** For routers with AC input, plug the router’s power cord into a three-terminal, single-phase power source that provides power within the acceptable range.
- Step 2** Power on the router. The LED labeled SYSTEM on the front panel should come on.
- If you encounter problems when you power on the router, see the [“Troubleshooting”](#) section that follows.
-

Troubleshooting

Check the following items to help isolate problems with the power supply installation:

- With the power switch on, is the corresponding system power supply LED on the front panel on? See [Figure 19](#) for LED status indicators.
 - If not, check the AC or DC input, AC or DC source, router circuit breaker, and the power supply cable (AC) or power supply wiring (DC).
 - If the power LED is still off, the problem might be a power supply failure.

Figure 19 LED Indicators on the Cisco 3745 Router



- Does the router shut down after being on for a short time?
 - Check the fans. If the fans are not working, the router overheats and shuts itself down.
 - If the fans are not working, check the power supply connections to the fans.
 - Ensure that the chassis intake and exhaust vents are clear.
 - Check the environmental site requirements in your router installation and configuration guide.

Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation on the World Wide Web at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

International Cisco websites can be accessed from this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which may have shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

Registered Cisco.com users can order the Documentation CD-ROM (product number DOC-CONDOCCD=) through the online Subscription Store:

<http://www.cisco.com/go/subscription>

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:
<http://www.cisco.com/en/US/partner/ordering/index.shtml>
- Registered Cisco.com users can order the Documentation CD-ROM (Customer Order Number DOC-CONDOCCD=) through the online Subscription Store:
<http://www.cisco.com/go/subscription>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can submit comments electronically on Cisco.com. On the Cisco Documentation home page, click **Feedback** at the top of the page.

You can e-mail your comments to bug-doc@cisco.com.

You can submit your comments by mail by using the response card behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com, which includes the Cisco Technical Assistance Center (TAC) Website, as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from the Cisco TAC website. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC website, including TAC tools and utilities.

Cisco.com

Cisco.com offers a suite of interactive, networked services that let you access Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

To obtain customized information and service, you can self-register on Cisco.com at this URL:

<http://www.cisco.com>

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC website and the Cisco TAC Escalation Center. The avenue of support that you choose depends on the priority of the problem and the conditions stated in service contracts, when applicable.

We categorize Cisco TAC inquiries according to urgency:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.

- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Cisco TAC Website

You can use the Cisco TAC website to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC website, go to this URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC website. Some services on the Cisco TAC website require a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

<http://tools.cisco.com/RPF/register/register.do>

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC website, you can open a case online at this URL:

<http://www.cisco.com/en/US/support/index.html>

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC website so that you can describe the situation in your own words and attach any necessary files.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:
http://www.cisco.com/en/US/products/products_catalog_links_launch.html
- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary*, *Internetworking Technology Handbook*, *Internetworking Troubleshooting Guide*, and the *Internetworking Design Guide*. For current Cisco Press titles and other information, go to Cisco Press online at this URL:
<http://www.ciscopress.com>
- *Packet* magazine is the Cisco monthly periodical that provides industry professionals with the latest information about the field of networking. You can access *Packet* magazine at this URL:
http://www.cisco.com/en/US/about/ac123/ac114/about_cisco_packet_magazine.html
- *iQ Magazine* is the Cisco monthly periodical that provides business leaders and decision makers with the latest information about the networking industry. You can access *iQ Magazine* at this URL:
http://business.cisco.com/prod/tree.taf%3fasset_id=44699&public_view=true&kbns=1.html
- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in the design, development, and operation of public and private internets and intranets. You can access the *Internet Protocol Journal* at this URL:
http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html
- Training—Cisco offers world-class networking training, with current offerings in network training listed at this URL:
http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html

This document is to be used in conjunction with your router's software configuration guide, the *Regulatory Compliance and Safety Information* document for your router, and the Cisco IOS configuration guides and command references for your Cisco IOS release.

CCIP, CCSP, the Cisco Arrow logo, the Cisco *Powered* Network mark, the Cisco Systems Verified logo, Cisco Unity, Follow Me Browsing, FormShare, iQ Breakthrough, iQ FastTrack, the iQ Logo, iQ Net Readiness Scorecard, Networking Academy, ScriptShare, SMARTnet, TransPath, and Voice LAN are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, The Fastest Way to Increase Your Internet Quotient, and iQuick Study are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, the Cisco IOS logo, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Empowering the Internet Generation, Enterprise/Solver, EtherChannel, EtherSwitch, Fast Step, GigaStack, Internet Quotient, IOS, IP/TV, iQ Expertise, LightStream, MGX, MICA, the Networkers logo, Network Registrar, *Packet*, PIX, Post-Routing, Pre-Routing, RateMUX, Registrar, SlideCast, StrataView Plus, Stratm, SwitchProbe, TeleRouter, and VCO are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries.

All other trademarks mentioned in this document or Web site are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0301R)

Copyright © 2002–2003 Cisco Systems, Inc. All rights reserved.